### IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



In re application of:

Khan et al.

Appl. No. 09/783,034

Filed: February 15, 2001

For: Die-Down Ball Grid Array

Package with Die-Attached Heat Spreader and Method for Making

the Same (As Amended)

Confirmation No. 5713

Art Unit: 2826

Examiner: Andujar, L.

Atty. Docket: 1875.0210000

# **Information Disclosure Statement**

Commissioner for Patents Washington, D.C. 20231

Sir:

Listed on accompanying Form PTO-1449 are documents that may be considered material to the examination of this application, in compliance with the duty of disclosure requirements of 37 C.F.R. §§ 1.56, 1.97 and 1.98.

Where the publication date of a listed document does not provide a month of publication, the year of publication of the listed document is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the month of publication is not in issue. Applicants have listed publication dates on the attached PTO-1449 based on information presently available to the undersigned. However, the listed publication dates should not be construed as an admission that the information was actually published on the date indicated.

Applicants reserve the right to establish the patentability of the claimed invention over any of the information provided herewith, and/or to prove that this information may not

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be prior art, and/or to prove that this information may not be enabling for the teachings purportedly offered.

This statement should not be construed as a representation that a search has been made, or that information more material to the examination of the present patent application does not exist. The Examiner is specifically requested not to rely solely on the material submitted herewith.

Applicants have checked the appropriate boxes below.

- □ 1. This Information Disclosure Statement is being filed within three months of the date of filing of a national application other than a continued prosecution application (CPA), OR within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application, OR before the mailing date of a first Office Action on the merits OR before the mailing of a first Office Action after the filing of a request for continued examination under 37 C.F.R. § 1.114. No statement or fee is required.
- 2. This Information Disclosure Statement is being filed more than three months after
  the U.S. filing date AND after the mailing date of the first Office Action on
  the merits, but before the mailing date of a Final Rejection, or Notice of
  Allowance, or an action that otherwise closes prosecution in the application.
  - □ a. I hereby state that each item of information contained in this Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(1).
  - □ b. I hereby state that no item of information in this Information Disclosure

    Statement was cited in a communication from a foreign patent office
    in a counterpart foreign application and, to my knowledge after
    making reasonable inquiry, was known to any individual designated

		in 37 C.F.R. § 1.56(c) more than three months prior to the filing of
		this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(2).
	⊠ c.	Attached is our Check No. 35656 in the amount of \$180.00 in
		payment of the fee under 37 C.F.R. § 1.17(p).
□ 3.	This l	Information Disclosure Statement is being filed more than three months after
		the U.S. filing date and after the mailing date of a Final Rejection or Notice
		of Allowance, but before payment of the Issue Fee. Enclosed find our Check
		No in the amount of \$ in payment of the fee under 37
		C.F.R. § 1.17(p); in addition:
	□ a.	I hereby state that each item of information contained in this Information
		Disclosure Statement was cited in a communication from a foreign
		patent office in a counterpart foreign application not more than three
		months prior to the filing of this Information Disclosure Statement.
		37 C.F.R. § 1.97(e)(1).
	□ b.	I hereby state that no item of information in this Information Disclosure
		Statement was cited in a communication from a foreign patent office
		in a counterpart foreign application and, to my knowledge after
		making reasonable inquiry, was known to any individual designated
		in 37 C.F.R. § 1.56(c) more than three months prior to the filing of
		this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(2).
□ 4.	The d	ocument(s) was/were cited in a search report by a foreign patent office in a
		counterpart foreign application. Submission of an English language version
		of the search report that indicates the degree of relevance found by the
		foreign office is provided in satisfaction of the requirement for a concise
		explanation of relevance. 1138 OG 37, 38.
□ 5.	A con	cise explanation of the relevance of the non-English language document(s)
		appears below:
□ <b>6</b> .	Copie	s of the documents were cited by or submitted to the Office in an IDS that
		complies with 37 C.F.R. § 1.98(a)-(c) in Application No, filed
		, which is relied upon for an earlier filing date under 35 U.S.C.

§ 120. Thus, copies of these documents are not attached. 37 C.F.R. § 1.98(d).

It is respectfully requested that the Examiner initial and return a copy of the enclosed PTO-1449, and indicate in the official file wrapper of this patent application that the documents have been considered.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Jeller S. Ween

Jeffrey S. Weaver Attorney for Applicants

Registration No. 45,608

Date: 6-26-02

1100 New York Avenue, N.W. Suite 600 Washington, D.C. 20005-3934 (202) 371-2600

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APPLICATION NO.

APPLICANT

FORM PTO-1449

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Khan et al.

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INITIAL   DOCUMENT   DATE   NAME   CLASS   SUB-CLASS   FILING DATE			, ,			U.S. P	ATEN	T DOCUMENTS					
AB1   5,474,937   12/1995   Urushimo   437   209	EXAMINER INITIAL				DAT	E	NAA	<b>AE</b>		CLASS		FILING DATE	
AC1   5.534,467   07/1996   Rostoker   437   209   10/29/2001   AE1   09/784,259     Zhao et al.       10/29/2001   AE1   09/79/272     Zhao et al.       11/30/2001   AF1   09/742,366     Khan et al.       11/30/2001   AG1   AH1   A		AA1	5,3	97,921	03/1	995	Karr	Karnezos		257	779		
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AM1  OTHER (Including Author, Title, Date, Pertinent Pages, etc.)  AN 1 Ahn, S.H. and Kwon, Y.S., "Popcorn Phenomena in a Ball Grid Array Package", IEEE Transactions on Components, Packaging, and Manufacturing Technology Part B: Advanced Packaging, IEEE, August 1995, Vol. 18, No. 3, pp. 491-96.  AO 1 Amkor Electronics, "Amkor BGA Packaging: Taking The World By Storm", Electronic Packaging & Production, Cahners Publishing Company, May 1994, page unknown.  AP 1 Anderson, L. and Trabucco, B., "Solder Attachment Analysis of Plastic BGA Modules", Surface Mount International Conference, Surface Mount International, August 28-September 1, 1994, San Jose, California, pp. 189-194.  AQ 1 Andrews, M., "Trends in Ball Grid Array Technology," Ball Grid Array National Symposium, March 29-30, 1995, Dallas, Texas, 10 pages.  Attarwala, A.I. Dr. and Stierman, R., "Failure Mode Analysis of a 540 Pin Plastic Ball Grid Array", Surface Mount International Conference, Surface Mount International, August 28-September 1, 1994, San Jose, California, pp. 252-257.		AJ1 EP 0 504 411 B1				06/1998		EPO		HOIL		Yes No	
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Anderson, L. and Trabucco, B., "Solder Attachment Analysis of Plastic BGA Modules", Surface Mount International Conference, Surface Mount International, August 28-September 1, 1994, San Jose, California, pp. 189-194.  Andrews, M., "Trends in Ball Grid Array Technology," Ball Grid Array National Symposium, March 29-30, 1995, Dallas, Texas, 10 pages.  Attarwala, A.I. Dr. and Stierman, R., "Failure Mode Analysis of a 540 Pin Plastic Ball Grid Array", Surface Mount International Conference, Surface Mount International, August 28-September 1, 1994, San Jose, California, pp. 252-257.		AZ	1	Ahn, S.H. a Transaction	nd Kv s on	won, Y.S., Componer	imponents, Packaging, and Manufacturing Technology Part B: Advanced						
AP 1 Mount International Conference, Surface Mount International, August 28-September 1, 1994, San Jose, California, pp. 189-194.  Andrews, M., "Trends in Ball Grid Array Technology," Ball Grid Array National Symposium, March 29-30, 1995, Dallas, Texas, 10 pages.  Attarwala, A.I. Dr. and Stierman, R., "Failure Mode Analysis of a 540 Pin Plastic Ball Grid Array", Surface Mount International Conference, Surface Mount International, August 28-September 1, 1994, San Jose, California, pp. 252-257.		AO	1	Amkor Electronics, "Amkor BGA Packaging: Taking The World By Storm", Electronic Packaging & Production, Cahners Publishing Company, May 1994, page unknown.									
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SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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APPLICATION NO.

APPLICANT Khan et al.

FILING DATE February 15, GR(28)

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	Chadima, M., "Interconnecting Structure Manufacturing Technology," Ball Grid Array National Symposium, Dallas, Texas, March 29-30, 1995.										Array National	
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**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in

conformance and not considered. Include copy of this form with next communication to Applicant.

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	AO	4	Edwards, I of PQFP, T Technolog	D. et a herma y Conf	l., "The Eff Illy Enhanc erence, IE	ect o ed PC EE, M	f Internal Package De QFP, LOC and BGA Pa ay 21-24, 1995, Las	elaminations o ackages", 45th Vegas, NV, pp	n the Thern Electronic ( . 285-292.	nal Performance Components &		
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**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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**U.S. PATENT DOCUMENTS** 

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	AN	<u>5</u>	Fauser, Suzanne et al., "High Pin Count PBGA Assembly: Solder Defect Failure Modes and Cause Analysis", Surface Mount International, Proceedings of The Technical Program, Surf Mount International, August 28-September1, 1994, San Jose, California, pp. 169-174.									
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	AP	<u>6</u>	Freyman, E Texas, Mar	3., "Tre ch 29-	ends in Pla -30, 1995,	stic B 45 pa	GA Packaging," Ballages.	l Grid Arr	ay Natio	onal Sympo	sium, Dallas,
	AQ	<u>6</u>	Gilleo, K., ' IHS Publish	'Electro ning G	onic Polym roup, Septi	ers: l embe	Die Attach and Oriei r/October 1994, Vo	nted Z-A	kis Films 5, pp. 3	s", Advance 7-38, 40 an	d Packaging, d <b>42</b> .
	AR	<u>6</u>	Guenin, B. Transaction Componen 4, pp. 749-	ns on ( ts, Pac	"Analysis ( Componen ckaging, ar	of a T ts, Pa nd Ma	Thermally Enhanced ickaging, and Manufound Techno	l Ball Grid facturing llogy Soci	Array I Techno ety, De	Package", II Blogy, Part A Cember 199	EEE A, IEEE 5, Vol. 18, No.

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**EXAMINER** 

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

ATTY. DOCKET NO. 1875.0210000

APPLICATION NO. 09/783,034

APPLICANT Khan et al

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	AO	Z	Hart, C. "Vias in Pads", Circuits Assembly, February 1995, Vol. 6, No. 2, pp. 42, 44-46 and 50.									
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	AQ	7	Heitmann, Advanced 103.	R., "A Packa	Direct Atging, IHS	tach E Publis	volution: TAB, CO hing Group, July/A	B and lugust	Flip Chip As 1994, Vol. 3	sembly Cha 3, No. 4, pp	allenges", b. 95-99 and	
	AR	<u>z</u>	Hodson, T., "Study Examines BGA Use", Electronic Packaging & Production, March 1993, page unknown.									
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	AQ	8	Huang, W. by Simulati West '95, F	and fon ar	Ricks, J.,"E nd Measure ary 26-Mar	lectric ement ch 2,	cal Characterization ", National Electron 1995, Anaheim, Cal	of PBGA ( ic Packagi lifornia, p	for Coming and p. 300-3	munication Production 307.	n Applications n Conference
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	AR	9	Johnson, R National Ek 14-17, 199	et allectron 3, pp.	., "Therma ic Packagir 423-430.	l Chai	acterization of Control Control	of 140 and 2 onference Ea	225 Pi ast '93	n Ball 3, Bost	Grid Array on, Massa	Packages", chusetts, June
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	AO	<u>13</u>	Mawer, A. o Internation 1994, San	al Coı	nference Pi	rocee	lder Joint Reliabi dings, Surface M 39-251.	lity Cons ount Int	siderations", ernational,	, Surface M August 28-:	ount September1,
	АР	<u>13</u>	Mazzullo, T Technology	. and Mag	Schaertl, L azine, Febr	, "H ruary	ow IC Packages / 1995, Vol. 9, No.	Affect P( . 2, pp. :	CB Design", 114-116.	Surface Mo	ount
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	AR	14	"Pad Array Company,	Impro May 1	oves Dens 992, pp. 2	ity", E 25-26.	lectronic Packaging	j & Pro	duction, Ca	ahners Pub	lishing
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	AO	<u>15</u>	Array", Sui	face i	Mount Int	ernatio	igue Life Compar onal Conference I an Jose, Californi	Proceedin	as, Surfac	ter and Ful e Mount In	Plastic Ball Grid ternational,
	AP	<u>15</u>	Rogren, P. Production	, "MCI Conf	M-L Built o erence We	on Ball est '94	Grid Array Form , Anaheim, Califo	ats", Nati ornia, pp.	onal Elect 1277-1282	ronic Packa 2.	iging and
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	AR	<u>15</u>	Rukavina, Symposiun	J., "At 1, Dal	tachment las, Texas	Metho , Marc	odologies: Ball Gr h 29-30, 1995, 3	rid Array 7 7 pages.	Гесhnolog	y", Ball Gri	d Array National
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	AO	<u>16</u>	Sakaguchi,	H., "E	3GA Mount	ingTe	chnology," <sub> </sub>	pgs. 1-4, dat	e and sourc	e unknown	
	AP	16	Schmolze, ( Packaging &	C. and	d Fraser, A. duction, Ja	., "SP: nuary	ICE Modelin 1995, pp. 5	g Helps Enha 50-52.	ince BGA Pe	erformance	", Electronic
	AQ	<u>16</u>	Semiconduc document s	ctor G	iroup Packa tted.	age O	utlines Refe	rence Guide,	Texas Inst	ruments, 1	995, entire
	AR	<u>16</u>	Shimizu, J., Jose, Califo	"Plas rnia, <i>i</i>	tic Ball Gri August 31-	d Arra Septe	y Coplanrity mber 2, 19	/", Surface M 93, pp. 86-91	ount Intern	ational Cor	nference, San
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	AO	<u>20</u>	Hayden, T.F. et al., "Thermal & Electrical Performance and Reliability Results for Cavity-Up Enhanced BGAs", Electronic Components and Technology Conference, IEEE,1999, pp. 638-										
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